0000 12991
~~00000 2991~~

Halliburton NUS
CORPORATION

452 Burbank Street
Broomfield, CO 80020

(303) 466-3573
FAX: (303) 469-6354

August 4, 1993

Mr. Leon A. Collins
Solar Ponds Remediation Program
EG&G Rocky Flats, Inc.
Building 080
P. O. Box 464
Golden, Colorado 80402-0464

Subject: ROCKY FLATS PLANT SOLAR EVAPORATION PONDS STABILIZATION PROJECT [WBS 750 SITE SPECIFIC HEALTH & SAFETY PLAN – HALLIBURTON NUS ROCKY FLATS] REVIEW OF RADIOLOGICAL RISK ASSESSMENT RF-HED-93-0455

Dear Mr. Collins:

In response to your request for a HALLIBURTON NUS review of RADIOLOGICAL RISK ASSESSMENT by Mr. K. D. Anderson (undated), the attached comments are submitted.

Please contact me if you have any questions or comments.

Sincerely,

HALLIBURTON NUS CORPORATION

John A. Schmidt
John A. Schmidt
Deputy Project Manager

JAS/jeg

Enclosure: (REVIEW & COMMENTS ON "RADIOLOGICAL RISK ASSESSMENT [RRA], SOLAR POND 207C AND CLARIFIER WASTE STREAM, GENERAL SITE ACCESS, RESUBMITTED, NO DATE)

cc: T. Beckman
T. Bittner

A:\LTR\COLLINS3
RF-HED-93-0455

Halliburton NUS
CORPORATION

452 Burbank Street
Broomfield, Colorado 80020
(303)466-3573
(303)469-6354 (FAX)

INTERNAL CORRESPONDENCE

Date: August 4, 1993

TO: John Schmidt

FROM: Ron Hill, C.I.H./Jack Templeton, P.E. RH JGT

RE: Review and Comments on "Radiological Risk Assessment (RRA), Solar Pond 207C and Clarifier Waste Stream, General Site Access, Resubmitted, no date.

At your request, the subject RRA document has been reviewed. The object of the RRA document is to evaluate the potential radiological hazards from the inhalation of radionuclides by workers assigned to the Solar Ponds Project. This is a vital document for the development of the health & safety plan, education of workers, and implementation of health & safety procedures. Comments on the RRA are included below:

1) Page 3, last paragraph. Please include a table or sentence giving measured site activity levels. For comparison to the radiologically contaminated areas at the Ponds, include typical background levels at the Rocky Flats facility. One suggestion is a map with radiological activity isopleths.

2) Page 5, Calculation 1. The RCRA reportable pint or pound is a regulatory reporting limit, and in the subject report, would underestimate operational exposure scenarios under catastrophic conditions if used as the sole case. We recommend using additional exposure scenarios to give a risk assessment range from extreme operational malfunctions which would include "worst case" scenarios. Additional exposure scenario cases are suggested for this risk assessment report, and are as follows:

   Use the RCRA quantity for <u>Case 1</u>, which might include a small leak from a pump packing, to anticipate small spills which may occur as a standard operational procedure. Use homogenized C Pond solution and sludge for the calculation.

   Calculate a <u>Case 2</u> for an undiluted waste from C Pond that spills from a tank rupture or line break spilling into a containment. Use an estimated spill volume of 3000 gallons of C Pond solution from the brine solution tank or piping.

   (Note: The above Case 2 applies as a "worst case" for the 207C Pond since the liquid has a higher radiological activity than the sludge. If the reverse were true, i.e. sludge activity were greater than liquid activity, than the case and subsequent calculation would have to be modified to reflect the changed parameters.)

   Calculate a <u>Case 3</u> for a spilled halfcrate. Use C Pond solution from Case 2 and pozzolan. A maximum halfcrate volume is estimated at 275 gallons.

   Calculate a <u>Case 4</u> for a spill emanating from the filling of a halfcrate while pumping from the RCM. Use C Pond solution from Case 2 and pozzolan. Use an estimated spill volume of 340 gallons (the complete volume of the RCM feeding the halfcrate).

3) Pages 5 & 6, Dilution factors. The application of dilution factors is a useful tool for estimating exposure scenarios in <u>Cases 3 and 4</u>. The dilution factors used, however, must be on the same basis as A_o. The examples shown on pages 5 and 6 are not on this same basis throughout. Also, since the C Pond will be homogenized before processing, the radiological activity for water and sludge should be combined.

A simple estimate for Cases 1, 3 and 4 can be obtained by using a weighted average as follows:

$$\frac{(130{,}000\ \text{pCi/L})(\text{Volume}_{samliq}) + (8700\ \text{pCi/L})(\text{Volume}_{sludge})}{(\text{Volume}_{samliq} + \text{Volume}_{sludge})} \times \frac{\text{Volume}_{samtot}}{\text{Volume}_{protot}}$$

Volume_{samliq} is the volume of pond liquid at the time the rad sample was taken.
Volume_{proliq} is the volume of pond liquid at the time the time of processing.
Volume_{samtot} is the sum of Volume_{samliq} plus Volume_{sludge}.
Volume_{protot} is the sum of Volume_{proliq} plus Volume_{sludge}.

Using the "Volume_{proliq}" term accounts for changes in the pond volume due to evaporation, precipitation, and dilution. These calculations assume that the radiological activity of the ponds is constant from the time of sampling; and likewise, that the volume of the sludge is constant.

Similarly, the calculation for Case 2 would be:

$$\frac{(130{,}000\ \text{pCi/L})(\text{Volume}_{samliq})}{(\text{Volume}_{samliq})} \times \frac{\text{Volume}_{samliq}}{\text{Volume}_{proliq}}$$

And the calculations for Cases 3 and 4 would be:

$$\frac{(130{,}000\ \text{pCi/L})(\text{Volume}_{samliq})+(8700\ \text{pCi/L})(\text{Volume}_{sludge})+(A_{0\text{-}pozz})(\text{Volume}_{pozz})}{(\text{Volume}_{proliq} + \text{Volume}_{sludge} + \text{Volume}_{pozz})} \times \frac{(\text{Volume}_{samtot}+\text{Volume}_{pozz})}{(\text{Volume}_{samtot}+\text{Volume}_{pozz})}$$

$A_{0\text{-}pozz}$ is the rad content of the pozzolan
Volume_{pozz} is the volume of pozzolan in the stabilized waste

For these cases this is a straightforward and more accurate method of calculation than dilution factors, but requires that the calculation be performed for every case.

4) Page 6, last line. What and how was V = 5 L determined?

5) Page 7, C_A. The conversion factor should be inverted, i.e. change it to $(1000\ \text{L}/1\ \text{m}^3)$.

6) Page 7, and following pages. The calculations are actually for DAC ratio. It is suggested that all the DAC equations be changed to calculate %DAC. The report equations and text should be changed to reflect this.

7) Page 7, % DAC equation. Change "Measured" to "Estimated" Concentration/DAC x 100.

8) Page 7, Footnote 6. We do not have the reference cited in footnote 6 in order to confirm the 10^{-4} resuspension factor. It is requested that a copy of the report, or applicable pages be furnished to HNUS. If the report is loaned to HNUS, the HNUS office staff can copy the report here if copying is burdensome to the client's office staff.

9) Page 8, DAC for Composite sludge, gross beta/gamma. The Q_A value is 2.67×10^{-4} not 10^{-3}.

10) Page 10, third line. Please show the full calculation for determining the dose equivalent of 3.65×10^{-3}.

11) Page 10, Table 3. It would strengthen the report considerably to include a 207 Ponds site map showing the locations of the air monitors.

12) Page 10, Table 3. Why are 1990 data used in Table 3? Why not 1991 or 1992 data used? What were the maximal peak Pu air levels obtained? Under what circumstances were these maximal peaks obtained, and does this relate to conditions that may be encountered in pond processing?

13) Page 10, bottom of page. These calculations should be changed to reflect that the 95% Confidence Interval is being calculated, <u>not</u> the mean.

14) Page 11, first paragraph. Modify last sentence as follows: "However, no exposure exceeding 10% DAC would be expected from general access to the Solar Pond Area based on air monitoring data for 1990.

15) Page 11, last sentence, second paragraph. Modify last sentence as follows: "Given this, the level of personal protective equipment (PPE) could be downgraded from Level C to Modified Level D." This assumes that the new calculations will still support this conclusion.

y:\rhh\exposure\riskass4.893